

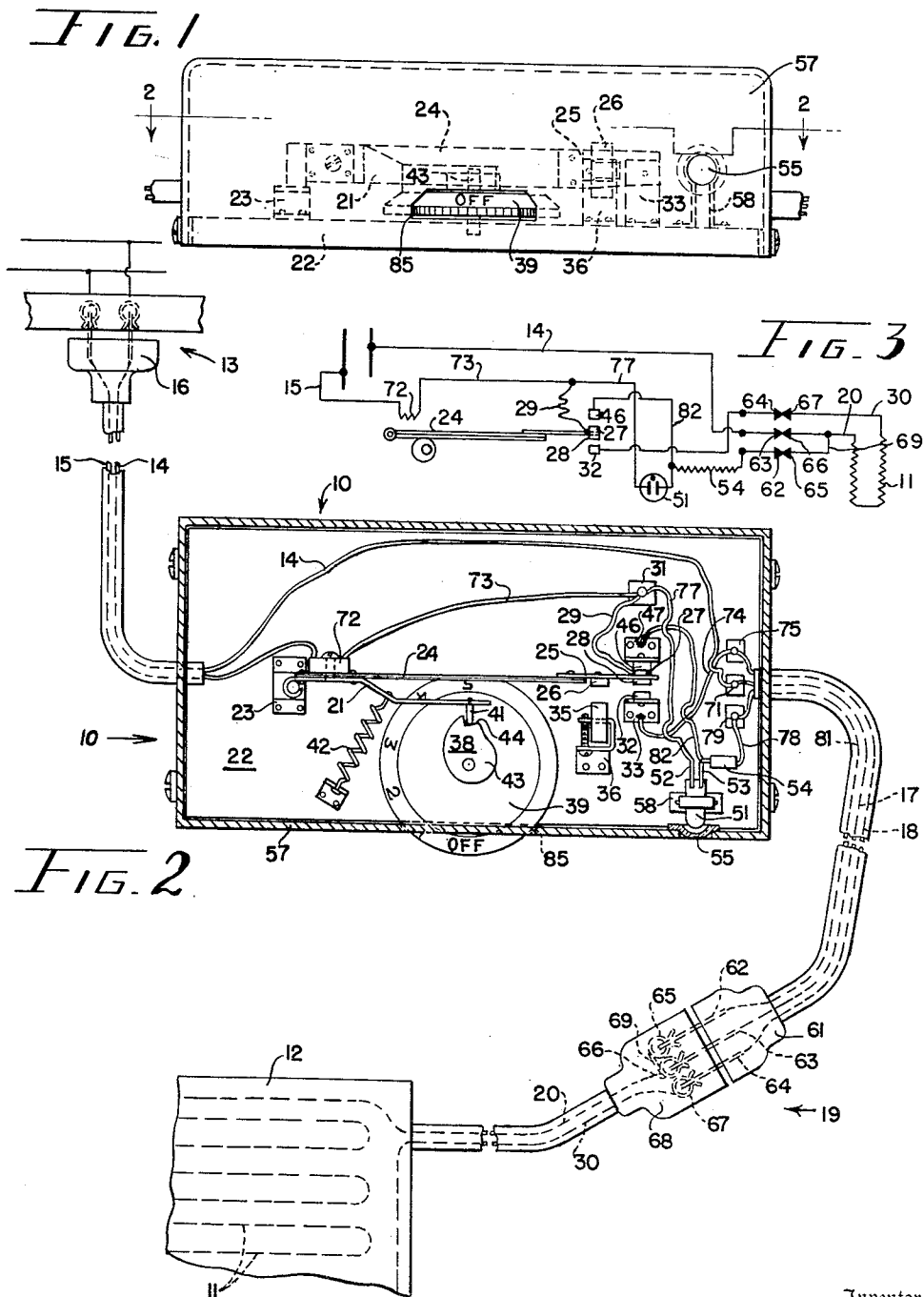
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THERMAL CONTROL APPARATUS WITH SIGNAL MEANS

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THERMAL CONTROL APPARATUS WITH
SIGNAL MEANS

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The present invention relates to an indicating light for an electric blanket controller.

In the use of electric blankets, difficulty is sometimes experienced due to the plug connected to the wall outlets being loose or pulled out and the plug connection between the controller and the blanket is also subject to this same fault. The light furnished in some blanket controllers will not, of course, operate if the wall plug is pulled out, but if the blanket plug is disconnected the light is, in the prior art devices, not affected.

In this latter case, considerable inconvenience and loss of sleep may result before the difficulty is discovered. This latter difficulty is quite prevalent for, in the daily making up of the bed, the blanket plug is frequently disconnected. To remedy this situation, the present invention provides, as a primary object, a controller having a signal means indicating whether or not both of a pair of connection plugs are in place.

It is a further object to provide a controller having a signal light operable at all times the controller is turned on providing that current is provided and that the controlled device is properly connected.

It is a further object to provide an improved circuit arrangement for the signal means of an electric blanket controller.

It is a further object to provide a controller for an electrical appliance wherein a signal circuit is completed on the appliance side of a connecting plug between the controller and the appliance.

It is a further object to provide a control device manually adjustable to an off position and having means for controlling a signal when so adjusted.

These and other objects will become apparent upon a study of the following specification and drawings wherein:

Figure 1 is a front elevation of a controller for an electric blanket.

Figure 2 is a section taken on the line 2—2 of Figure 1 and schematically shows the present circuit.

Fig. 3 is a simplified schematic wiring diagram of the apparatus of Fig. 2.

Referring to the drawings, controller 10 is used to control the energization of an electric heating element 11 in a blanket or other appliance 12, said controller being connected to a suitable source of current 13 by a pair of conductors 14 and 15 and a plug connector 16. Likewise, controller 10 is connected to blanket 12 by conductors 17—18 and 20—30 and an intervening detachable connection means 19.

Controller 10 comprises a lever member 21 pivotally attached to base 22 of said controller by bracket member 23, said lever serving as a mounting means for one end of a bimetal strip

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24. The other end of bimetal 24 carries an extension member 25 of insulating material such as Bakelite to which is attached a soft iron armature 26 and switch contacts 27 and 28, said contacts 27 and 28 being connected by a flexible conductor 29 to a terminal member 31. Contact 28 is arranged to engage stationary contact 32, secured to base 22 by bracket 33, when bimetal 24 is adjusted within its normal operating range and is responding to a relatively low temperature, said bimetal biasing contact 28 away from 32 on a temperature rise. Permanent magnet 35 is attached to base 22 by a bracket 36 and is arranged to be in registry with and slightly spaced from armature 26 when contacts 28 and 32 are in engagement, this being recognized as a conventional snap action arrangement used to provide positive switching action. Bimetal 24 is adjusted by moving lever 21, this being accomplished by cam 38 rotatable by a manually adjustable knob or wheel means 39, cam 38 engaging a follower member 41 attached to the right end of lever 21, follower 41 being held in engagement with cam 38 by a spring 42. Cam 38 is provided with a main portion 43 for adjusting bimetal 24 through its normal operating range and also has a fast rise to a relatively high dwell portion 44 for adjusting said bimetal beyond its normal range. When bimetal 24 is adjusted out of its normal range, and follower 41 is on dwell portion 44, contact 27 engages an additional switch contact 46 carried on bracket 47. Contacts 27 and 46 are used to control a signal light 51 which is in the nature of a very low wattage (about 1/4 watt) neon bulb, having terminals 52 and 53. A resistor 54 is connected in series with the light 51 and has a resistance value of about 225,000 ohms. To view light 51, a transparent or translucent lens or bullseye 55 is provided in cover 57 of the controller and light 51 is held in alignment with said lens by a suitable mounting bracket 58. Bimetal 24, in addition to being affected by ambient temperature, is also affected by a conventional anticipating or cycling heater 72 bolted on said bimetal in direct thermal contact therewith, said heater having about 3/8 ohms resistance, this low resistance giving adequate heating because of the relatively large current for element 11 passing therethrough.

Detachable connector means 19 comprises a member 61 having conductor members 62, 63 and 64 engageable with socket conductor members 65, 66 and 67, respectively, of connector member 68, socket members 66 and 67 being connected to heating element 11 by wires 20 and 30, respectively, and socket members 65 and 66 being connected together by conductor 69.

Cover 57 of controller 10 has a slot 85 in its front face through which a portion of knob or

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wheel 39 extends so that it is easily reached for adjustment and so that the indicia on its rim can be read. Obviously, if desired, light 51 may be located in a position to illuminate said indicia.

Because the circuits involved in this apparatus must necessarily be traced in describing its operation, no separate description of said circuit appears to be required.

Operation

With controller 10 adjusted as shown and with plug 16 connected to a source of current, a circuit may be traced from wire 15 through heater 72, wire 73, terminal 31, wire 77, terminals 52, and 53 of light 51, resistor 54, wire 78, terminal 79, wire 81, conductor member 62 and 65 of connector means 19, conductor 68, connector members 66 and 63, wire 17, terminal 71 and wire 14 back to the source of current. However, a parallel or shunt circuit exists around light 51, starting from terminal 31 and extending through conductor 29, contacts 27 and 46, bracket 47 and wire 32 to terminal 53 of said light hence, because of this shunt circuit, no energizing current passes through said light and, because resistor 54 is still in the afore-mentioned circuit, the current passing therethrough is negligible. Obviously, element 11 is not energized because of the open circuit at contact 32.

If knob 39 now be rotated counterclockwise to some desired value on the indicia scale, cam 38 will move so that follower 41 moves off the high dwell portion 44 and onto the main cam portion 43, thus permitting spring 42 to rotate lever 21 and bimetal 24 clockwise and, assuming a relatively low ambient temperature, moving contact 28 into engagement with contact 32. Upon contact 27 disengaging contact 46, the previously described circuit in parallel with light 51 is opened, hence said light now operates and thereby indicates that plug 16 is properly connected with a source of current and that members 61 and 68 of connector means 19 are connected. Further, element 11 is energized by the circuit, starting with conductor 15 and including heater 72, wire 73, terminal 31, wire 29, contacts 28 and 32, bracket 33, wire 74, terminal 75, wire 18, conductor members 64 and 67, wire 30, element 11, wire 20, conductor members 66 and 63, wire 17, terminal 71 and wire 14 back to the current supply. As the current for element 11 is now passing through heater 72, it rapidly heats bimetal 24 sufficiently to warp it upwardly and disengage contacts 28 and 32, thus breaking the energizing circuit for element 11. As nothing has taken place to break the circuit for light 51, it still operates, contact 46 being spaced beyond the normal off position for bimetal 24.

Upon opening contacts 28 and 32, element 11 starts cooling and heater 72 and bimetal 24 do likewise until the bimetal again engages contact 28 with 32 and starts another cycle of operation.

The above described operation of the apparatus is as intended and, without further complications, light 51 would be unnecessary unless it is used to illuminate adjusting knob 39. Obviously, if plug 16 be pulled out or loosened so that it fails to properly connect with the source of current 13, neither light 51 nor element 11 can operate for there is no current available for such operation. Although it is rather rare that plug 16 is pulled out and not replaced, it much more frequently happens that plug 61 is pulled out

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of 68 and not replaced. With the prior art signal arrangements, assuming that plug 16 is in, it would appear that the apparatus was functioning properly even though connector 19 be disconnected, until the user of the blanket or appliance finds that the device is not working. With the present arrangement, however, disconnection of 19 opens the energizing circuit for light 51 by disconnection of 62—65 and 66—63 hence, if connector 19, is opened, immediate notice is given by failure of light 51 to operate when knob 39 is adjusted to an "on" position and steps can be taken to discover the fault.

As a study of the above specification and drawings will reveal many substitutions and equivalents, the scope of the present invention should be determined only by the following claims.

I claim:

1. In control apparatus for an electrical appliance, a controller for said appliance, a first pair of conductors extending into said controller and also connected with connecting means adapted to be connected to a source of current, a second pair of conductors extending from said controller to a detachable connection means arranged between said controller and said appliance, said connection means comprising two separable members, one of said members having three projecting conductor means and the other of said members having three corresponding socket conductors arranged to be engaged by said projecting conductors, one of said first pair of conductors being connected to one of said second pair of conductors which in turn is connected to one of the conductor means of one of said connector members, a switch in said controller, thermostatic means for operating said switch, manually adjustable means for adjusting said thermostatic means within a normal operating range of said controller, said manual adjusting means also being adjustable to an off position wherein said thermostatic means is biased to a position outside the operating range of the controller, said switch being connected between the other of said first pair of conductors and the other of said second pair of conductors, the other of said second pair of conductors being connected to another of said conductor means of one said connector member, a signal light having a pair of terminals, means connecting one of said terminals to one of said first pair of conductors, a resistor, conductor means including said resistor connecting the other terminal on said light to the remaining conductor means of said one connector member, conductor means connecting the conductor means of the other connector member engageable with said remaining conductor means to the conductor means of said other connector member engageable with the conductor means of said one connector member connected to the other of said first pair of conductors, additional switch means operable upon adjusting said manual adjusting means to its off position, and circuit means controlled by said additional switch means for shunting said signal light.

2. In control apparatus for an electrical appliance, a controller for said appliance, a first pair of conductors connected to said controller and to a connection device adapted to be connected to a source of current, a second pair of conductors extending through a detachable connection for connection to said appliance, one of the conductors of said first pair being connected to a conductor of said second pair in said controller, a switching

means connected between the other conductor of said first pair and the other conductor of said second pair, temperature responsive means for operating said switching means, means for manually adjusting the operative relation of said temperature responsive means and said switching means through the normal operating range of said controller, said adjusting means also including means for adjusting said operative relation beyond said normal operating range, second switching means operable to close a circuit as a function of said adjusting means being adjusted out of the operating range of said controller, a signal light in said controller connected to one of said conductors connected through said controller, a resistor connected to said light, a third conductor extending from said resistor to said detachable connector and connecting to the conductor of said second pair other than the conductor to which said light is connected, and a circuit controlled by said second switching means for shunting said light.

3. In a controller for an electric appliance, a switch means, a temperature responsive means for operating said switch means, manually adjustable cam means having a portion for adjusting the operative relation of said temperature responsive means to said switch means within a normal operating range, a signal means for said controller, additional switch means for controlling said signal means, and an additional cam portion for operating said additional switch means in a manner to effectively deenergize said signal means only when said manually adjustable cam means is adjusted beyond said normal operating range.

4. In control apparatus for an electrical appliance, a controller having a pair of conductors arranged to be connected to a source of current, a second pair of conductors extending from said controller to a detachable connection means adapted to be connected to said appliance, said detachable connection means including a pair of conductor members attached to said second pair of conductors and an additional conductor member, a third conductor extending from said controller to said additional conductor member, a switch in said controller connected between one of said first pair of conductors and one of said second pair of conductors, the other of each of said pairs of conductors being connected together, additional switch means in said controller, a signal light for said controller, means connecting said light to one of said conductors and to said third conductor whereby, when said third conductor member is connected to an opposite one of said conductors on the appliance side of said detachable connection means said light may be energized, and means connecting said additional switch means in controlling relation to said signal light.

5. In control apparatus for an electrical appliance, a controller having a pair of conductors arranged to be connected to a source of current, a second pair of conductors extending from said controller to a detachable connection means adapted to be connected to said appliance, said detachable connection means including a pair of conductor members attached to said second pair of conductors and an additional conductor member, a third conductor extending from said controller to said additional conductor member, a switch in said controller connected between one of said first pair of conductors and one of said second pair of conductors, the other of each of

said pairs of conductors being connected together, a signal light for said controller, means connecting said light to one of said conductors to said third conductor whereby, when said third conductor member is connected to an opposite one of said conductors on the appliance side of said detachable connection means said light may be energized, and second switch means for controlling the energization of said light.

6. In an electric blanket control apparatus, a control device including a switch, a pair of current conductors connected to said device and adapted to be connected to a source of current, three electrical conductors leaving said device, two of said three conductors being connected to said pair of conductors, said switch controlling one of said connections, a signal light in said device, said light being connected to one of said current carrying conductors and to the third conductor leaving said device, circuit means for controlling said light, a detachable coupling member having three conductor means individually connected to said three conductors, said coupling member being adapted to unite with another coupling member having three conductor means and wherein, when two of said last named conductor means are connected together and the two members are in engagement, an energizing circuit for said light will be completed.

7. In control apparatus, a control device including a switch, a pair of current conductors connected to said device and adapted to be connected to a source of current, three electrical conductors leaving said device, two of said three conductors being connected to said pair of conductors, said switch controlling one of said connections, a signal light in said device, said light being connected to one of said current carrying conductors and to the third conductor leaving said device, circuit means for controlling said light, a detachable coupling member having three conductor means individually connected to said three conductors, said coupling member being adapted to unite with another coupling member having conductor means and wherein when said two members are connected together the third conductor means and the other of said two conductors are connected together to thereby complete an energizing circuit for said light.

8. In a controller for an electrical appliance, switch means for controlling said appliance, condition responsive means for operating said switch means, manually adjustable means for adjusting the operative relation of said condition responsive means to said switch means and having an off position, a signal light for said controller, circuit means independent of said switch means for energizing said light, additional switch means for controlling said light energizing circuit, said additional switch means being adjustable by said manually adjustable means in a manner to effectively deenergize said light only when said manually adjustable means is in its off position.

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